

Partial agreement in German: A processing issue?

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Overview

- Partial agreement: Syntactic vs. processing accounts
- Hypotheses of the processing account
- Corpus analysis: Written vs. spoken data
- Experiment 1: Incremental grammaticality judgements
- Experiment 2: Self-paced reading
- Results and conclusion



Partial agreement in German

- (1) a. Ein Mann und eine Frau stehen / *steht dort.
*A man and a woman stand / *stands there.*
- b. Dort stehen / steht ein Mann und eine Frau.
There stand / stands a man and a woman.
- Agreement with one conjunct (partial agreement) is only possible if the subject is preceded by the verb (1b).
 - Partial agreement in V-S word order is optional in German.



Partial agreement and syntax

- Munn (2000): Partial agreement as evidence for adjunction analysis (first conjunct is head of the coordinate phrase)
- Aoun et al. (1994): Partial agreement as evidence for clausal analysis („*There stands a man and there stands a woman.*“)
- **General problem:**
 - Different mechanisms depending on the position of the subject
 - The optionality of partial agreement



Processing account of partial agreement

- **Working hypothesis:**

Partial agreement results from incremental language processing from left to right. The relevant factor is the information available when the finite verb is processed (see also Marten (2005)).

- *Preverbal subjects*: the plurality of the subject is already computed when the verb is processed.
- *Postverbal subjects*: information about the subject is not yet available at the verb.



Processing account of partial agreement

- **Language production:**

Agreement with postverbal subjects depends on whether both conjuncts are already planned when the finite verb is processed.

- **Language comprehension:**

Agreement with postverbal subjects depends on how easy it is to retrieve verb information when the postverbal subject is processed, which can be influenced, e.g., by the distance between verb and subject.



Processing account of partial agreement

- Preference for partial or full agreement in V-S constructions should therefore be strongly influenced by processing load.
- The higher the processing load the more locally the language system operates, i.e., partial agreement should occur more frequently.
- Partial agreement should also be more acceptable in data sources that directly reflect processing mechanisms as, e.g., in spoken language or in reading times (online data) than in written texts or judgments (offline data).



Hypotheses of the processing account

- **Hypothesis 1:** Partial agreement should occur more frequently (or be processed more easily) in online data sources than in offline data.
- **Hypothesis 2:** Partial agreement should occur more frequently (or be processed more easily) when the subject is in postverbal position.
- **Hypothesis 3:** Partial agreement should occur more frequently (or be processed more easily) when the distance between verb and postverbal subject is increased (higher processing load).



Comparison of data types



Offline data	Online data
Newspaper corpus (TüBa-DZ, TAZ)	Spoken corpus data (TüBa-DS, Verbmobil)
Incremental grammaticality judgements	Self paced reading experiment

Corpus study

- TüBa-DZ (written, offline data):
 - German newspaper texts (TAZ)
 - 27.124 sentences
- TüBa-DS (spoken, online data):
 - German dialogs about business appointments
 - 38.196 sentences
- Search for conjoined singular subjects:
 - Agreement with one conjunct → singular
 - Agreement with both conjuncts → plural



Examples from TüBa-DZ (written)

- „In jeder Pilotenweste *ist* [ein Kompass] und [ein kleiner Sender zur Bestimmung des Abschussorts] integriert.“
(postverbal, partial agreement, sentence 10.031)
- „Bei heiteren bis wolkigen Abschnitten um die 18 Grad *kann* [Gemüse] und [Obst] auch in unseren Breiten so richtig gedeihen.“
(postverbal, partial agreement, sentence 3406)
- „[Ein Abbruch des Daches] und [eine Neuerrichtung mit leicht veränderter Konstruktion] *würde* knapp 2,7 Millionen Mark kosten.“
(preverbal, partial agreement, sentence 685)



Partial agreement in TüBa-DZ (written)

(data base: 14.940 sentences)

Position of subject	Agreement	V2 + VFinal
Preverbal	full	132 (98.5%)
Preverbal	partial	2 (1.5%)
Conjoined subjects (sg./sg.)		134
Postverbal	full	62 (84.9%)
Postverbal	partial	11 (15.0%)
Conjoined subjects (sg./sg.)		73

Preference for full agreement with preverbal and postverbal subjects.

Overall: 6.3% partial agreement, 93.7% full agreement



Examples from TüBa-DS (spoken)

- „Dann *ist* dort [ein Hallenbad] und [ein Fitnessraum] ...“
(postverbal, partial agreement, sentence 474 (CD49))
- „Also *bleibt* eigentlich nur noch [der Juni] und [der Juli].“
(postverbal, partial agreement, sentence 292 (CD15))
- „[Dienstag] und [Mittwoch] *passt* ausgezeichnet.“
(preverbal, partial agreement, sentence 530 (CD20))



Partial agreement in TüBa-DS (spoken)

(data base: 38.196 sentences)

Position of subject	Agreement	V2 + VFinal
Preverbal	full	10 (41.67%)
Preverbal	partial	14 (58.33%)
Conjoined subjects (sg./sg.)		24
Postverbal	full	1 (6.25%)
Postverbal	partial	15 (93.75%)
Conjoined subjects (sg./sg.)		16

Preverbal subjects: No clear preference.

Postverbal subjects: Preference for partial agreement

Overall: 72.5% partial agreement, 27.5% full agreement



Corpus results

- Partial agreement occurs significantly more frequently with postverbal subjects than with preverbal ones in written and spoken data ($\chi^2(1) = 9.7; p = .002$) and spoken data ($\chi^2(1) = 6.04; p = .014$).
→ confirms Hypothesis 2
- Partial agreement occurs significantly more frequently in spoken data (online data) than in written texts (offline data) ($\chi^2(1) = 85.6; p < .001$).
→ confirms Hypothesis 1



Experiments

- **Experiment 1:** Incremental grammaticality judgements (offline data source)
- **Experiment 2:** Self-paced reading (online data)
- *Advantage:*
 - Interaction with semantics can be reduced
 - Processing load can be varied systematically (distance between verb and subject)
- Same test materials in both experiments



Design (6 conditions)

- Factor „**Word order**“: Preverbal, postverbal, postverbal + distance (increased processing load)
- Factor „**Agreement**“:
Full agreement, partial agreement



Test materials (6 conditions)

- **Condition 1:** Preverbal, full agreement

Eine gutmütige Lehrerin/ und/ eine unerfahrene Referendarin/
gehen/ nach dem Unterricht/ frustriert/ aus dem Klassenzimmer.

*A good-natured teacher/ and/ an inexperienced student teacher/
go/ after the class/ frustrated/ out_of the classroom.*

- **Condition 2:** Preverbal, partial agreement

Eine gutmütige Lehrerin/ und/ eine unerfahrene Referendarin/
geht/ nach dem Unterricht/ frustriert/ aus dem Klassenzimmer.

*A good-natured teacher/ and/ an inexperienced student teacher/
goes/ after the class/ frustrated/ out_of the classroom.*



Test materials (6 conditions)

● Condition 3: Postverbal, full agreement

Frustriert/ **gehen**/ eine gutmütige Lehrerin/ und/ eine unerfahrene Referendarin/ nach dem Unterricht/ aus dem Klassenzimmer.

*Frustrated/ **go**/ a good-natured teacher/ and/ an inexperienced student teacher/ after the class/ out_of the classroom.*

● Condition 4: Postverbal, partial agreement

Frustriert/ **geht**/ eine gutmütige Lehrerin/ und/ eine unerfahrene Referendarin/ nach dem Unterricht/ aus dem Klassenzimmer.

*Frustrated/ **goes**/ a good-natured teacher/ and/ an inexperienced student teacher/ after the class/ out_of the classroom.*



Test materials (6 conditions)

- **Condition 5:** Postverbal + distance, full agreement

Frustriert/ **gehen**/ nach dem Unterricht/ eine gutmütige Lehrerin/
und/ eine unerfahrene Referendarin/ aus dem Klassenzimmer.

*Frustrated/ **go**/ after the class/ a good-natured teacher/ and/ an
inexperienced student teacher/ out_of the classroom.*

- **Condition 6:** Postverbal + distance, partial agreement

Frustriert/ **geht**/ nach dem Unterricht/ eine gutmütige Lehrerin/
und/ eine unerfahrene Referendarin/ aus dem Klassenzimmer.

*Frustrated/ **goes**/ after the class/ a good-natured teacher/ and/ an
inexperienced student teacher/ out_of the classroom.*



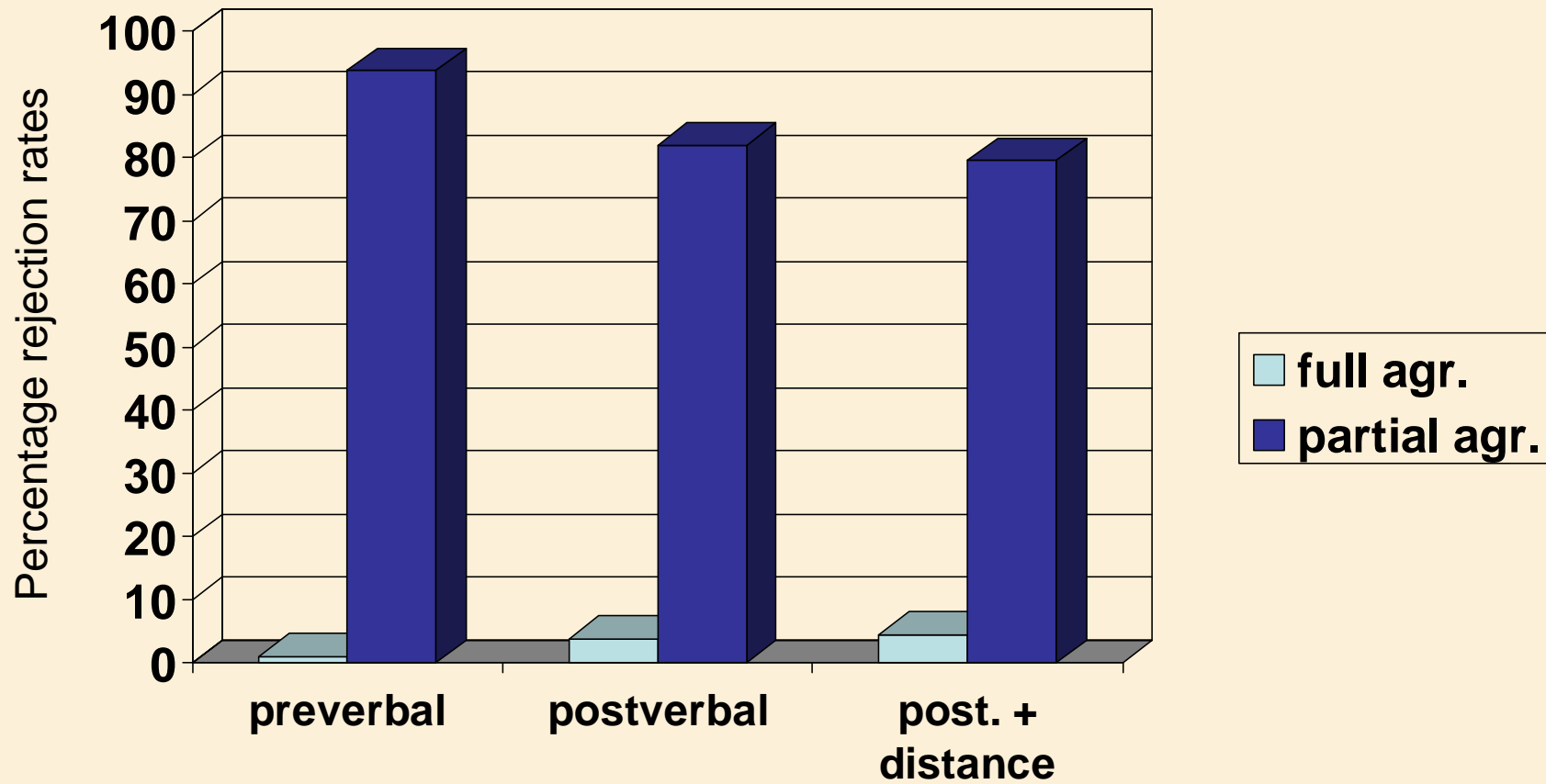
Incremental grammaticality judgements (offline data source)

Method:

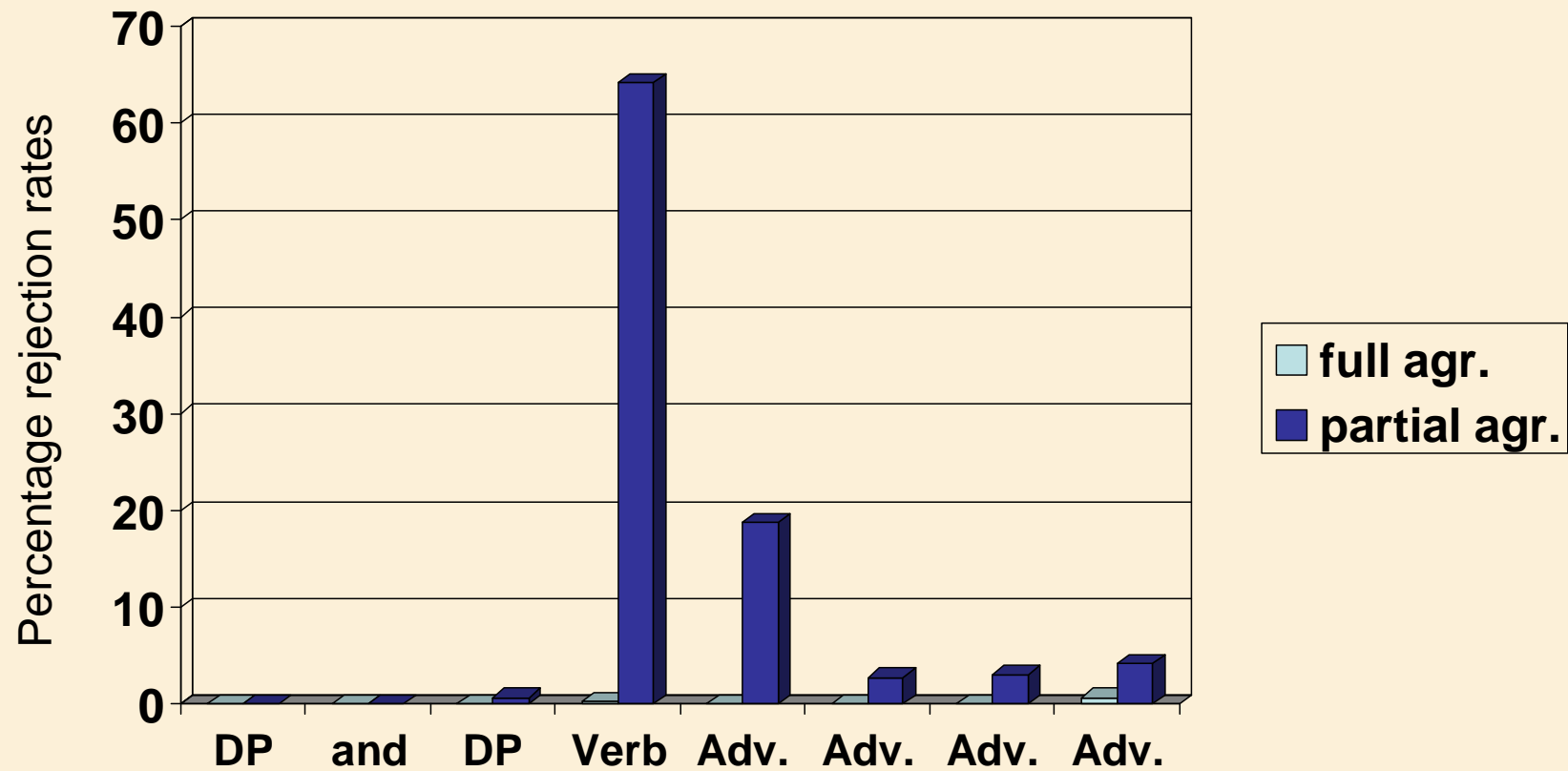
- Subjects read the sentence piece by piece as long as the sentence is grammatical
- Decision at each segment:
 - Proceed if the sentence is grammatical
 - Abort the trial if the sentence is ungrammatical
- 48 subjects
- 36 test sentences + 20 control items + 40 fillers
(overall: 96 sentences)



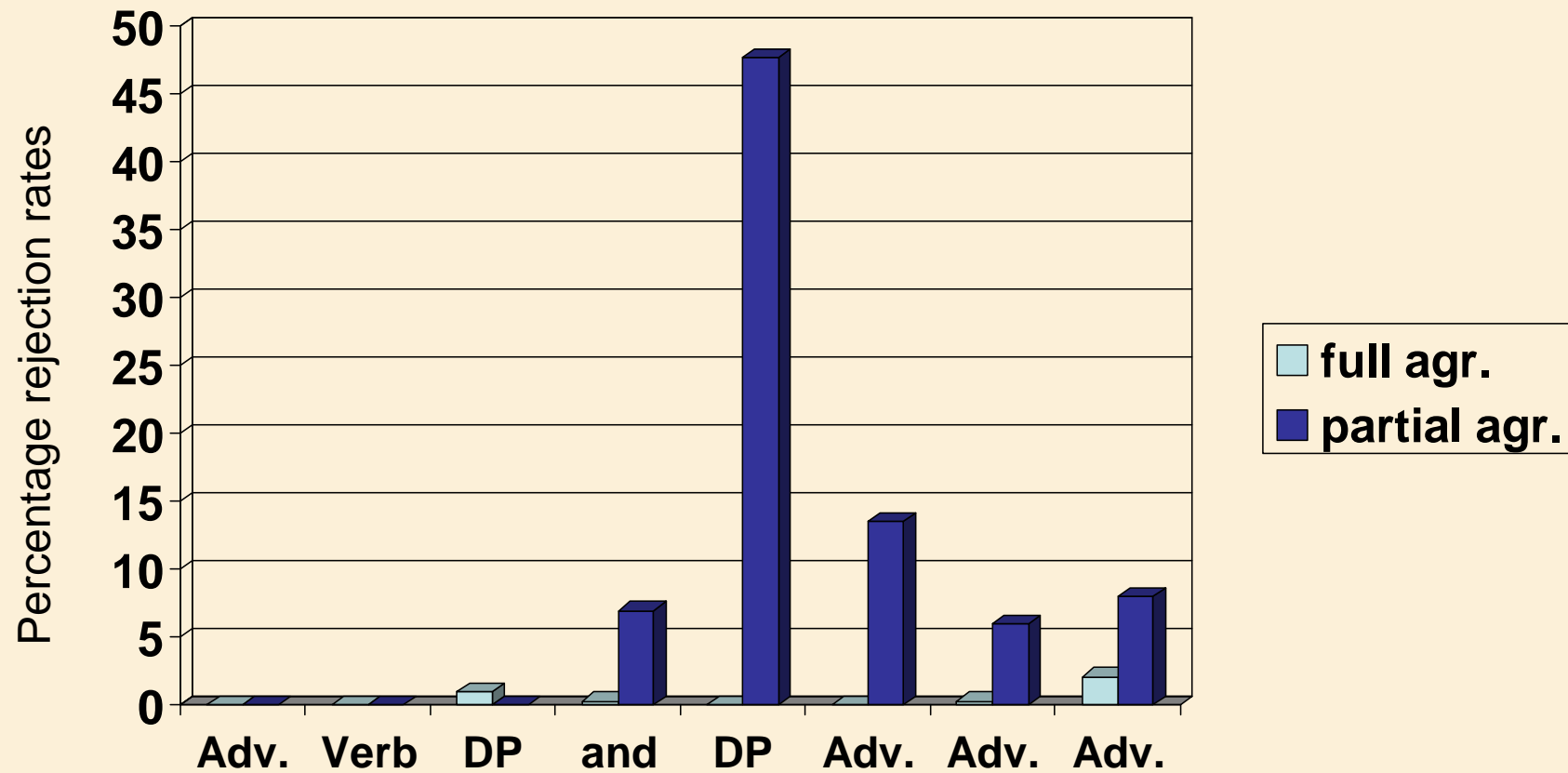
Overall rejection rates



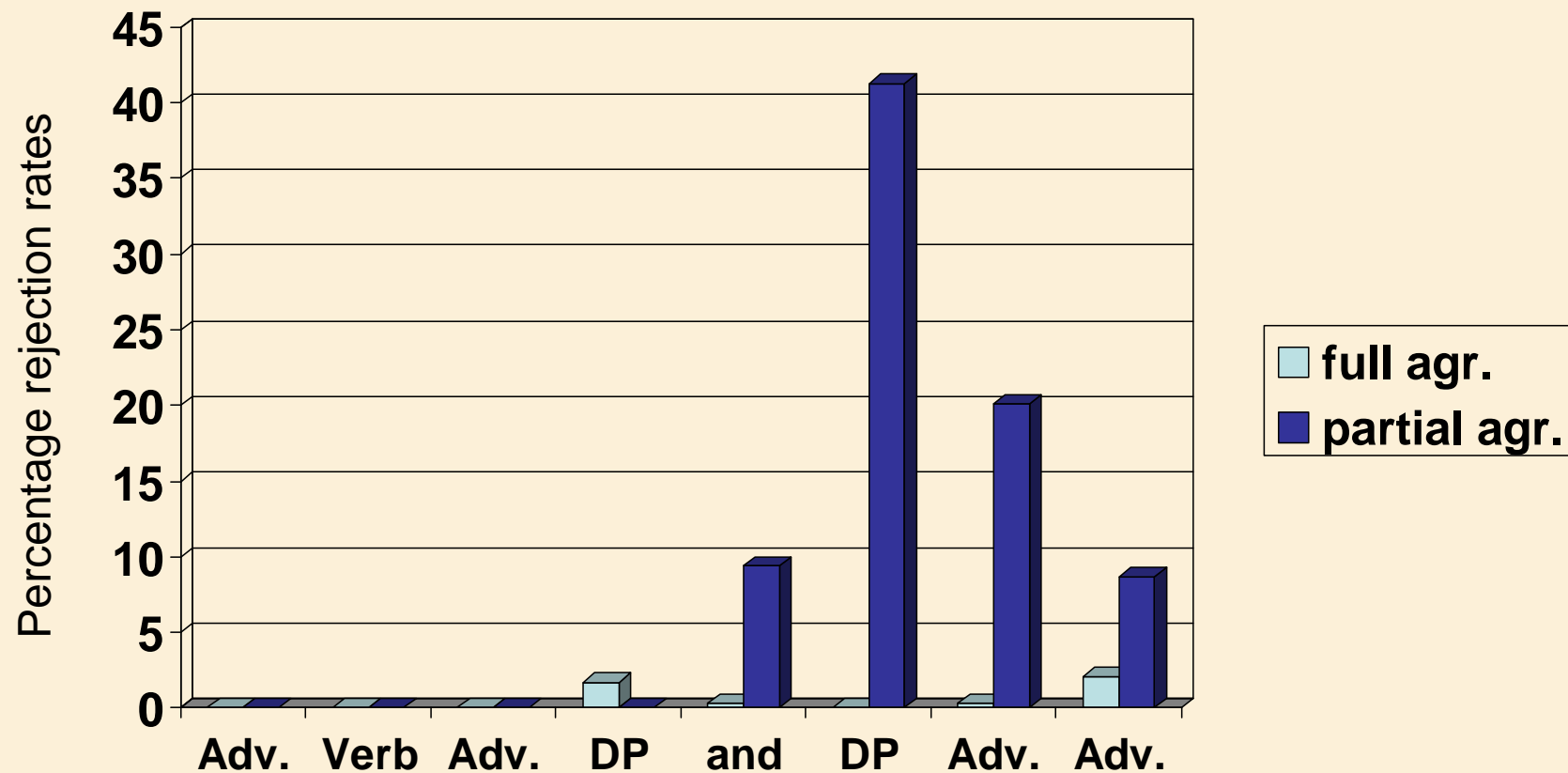
Rejection rates per segment (preverbal subjects)



Rejection rates per segment (postverbal subjects)



Rejection rates per segment (distant postverbal subjects)



Results:

Incremental grammaticality judgements

- Partial agreement is significantly more acceptable with postverbal subjects than with preverbal ones ($t_1(47) = 3.022, p=.004; t_2(35) = 3.114, p=.004$) → confirms Hypothesis 2
- Most participants rated partial agreement as ungrammatical (94% preverbal, 82% postverbal, 80% postverbal + distance).
- No difference between postverbal subjects and distant postverbal subjects
→ Hypothesis 3 cannot be confirmed

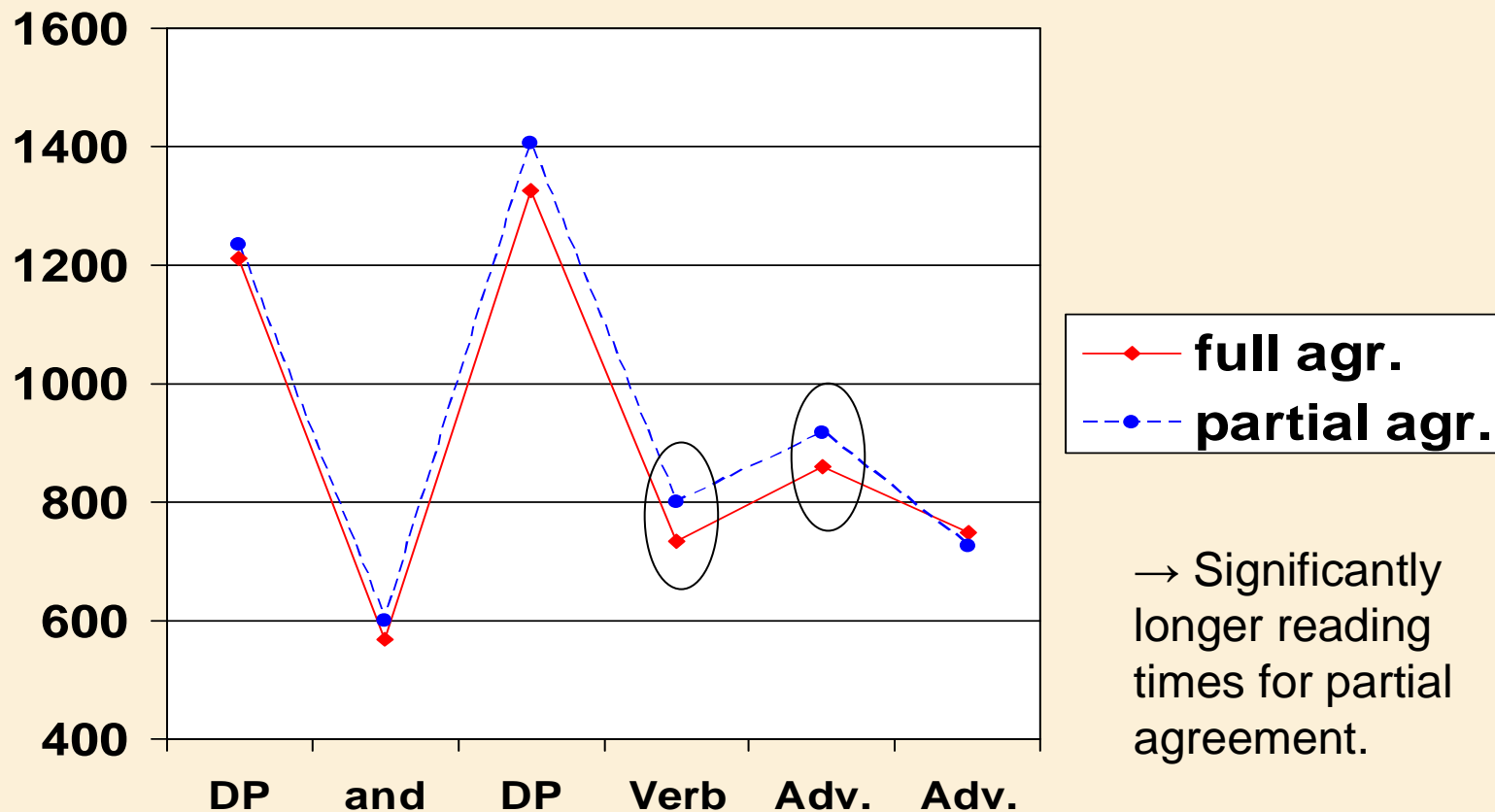


Self-paced reading experiment (online data)

- **Method:** *Self-paced reading with moving window* technique
- 48 subjects
- 36 test sentences + 20 control items + 40 fillers
(overall: 96 sentences)



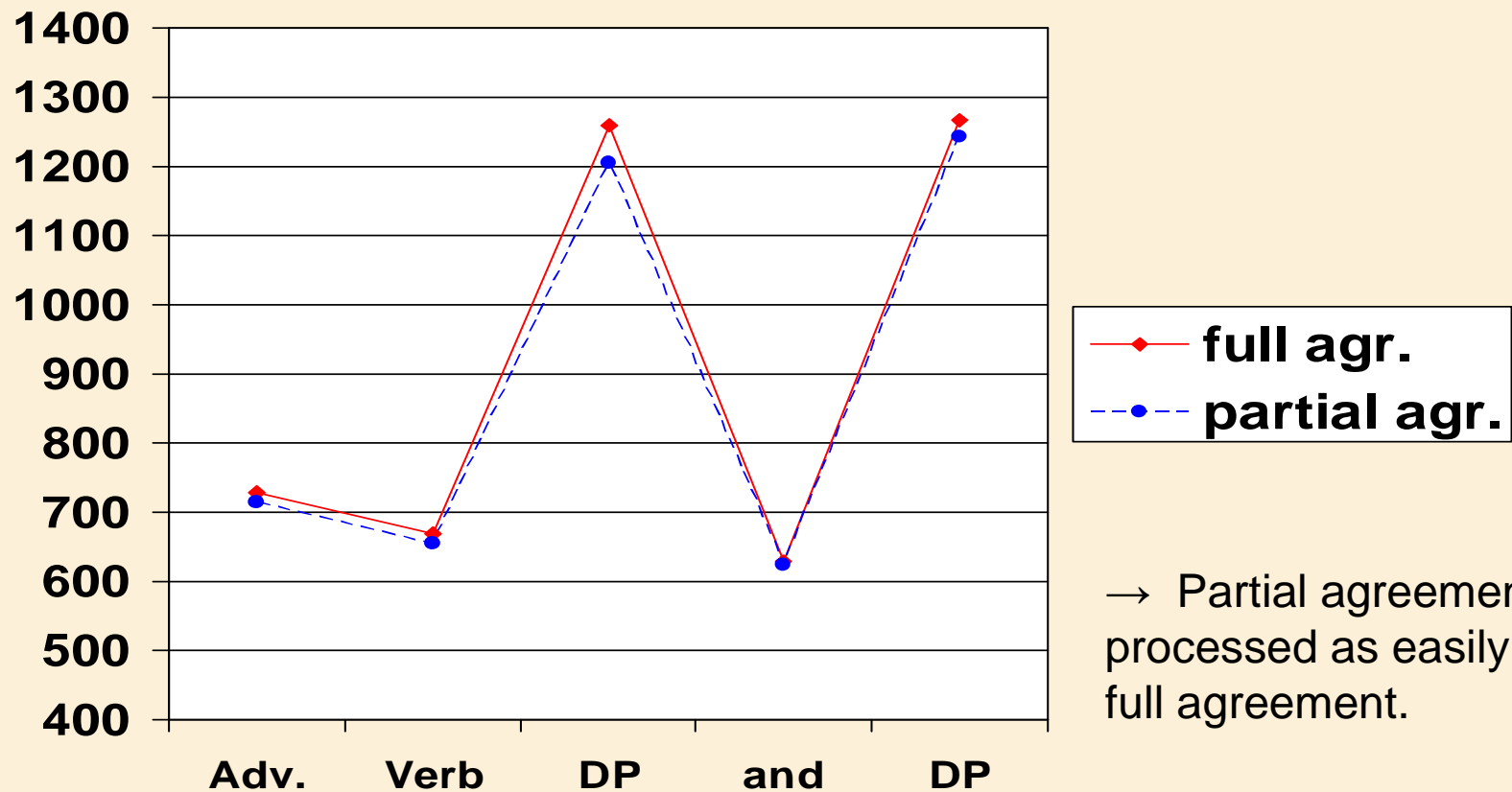
Mean reading times per segment (preverbal subjects)



→ Significantly longer reading times for partial agreement.



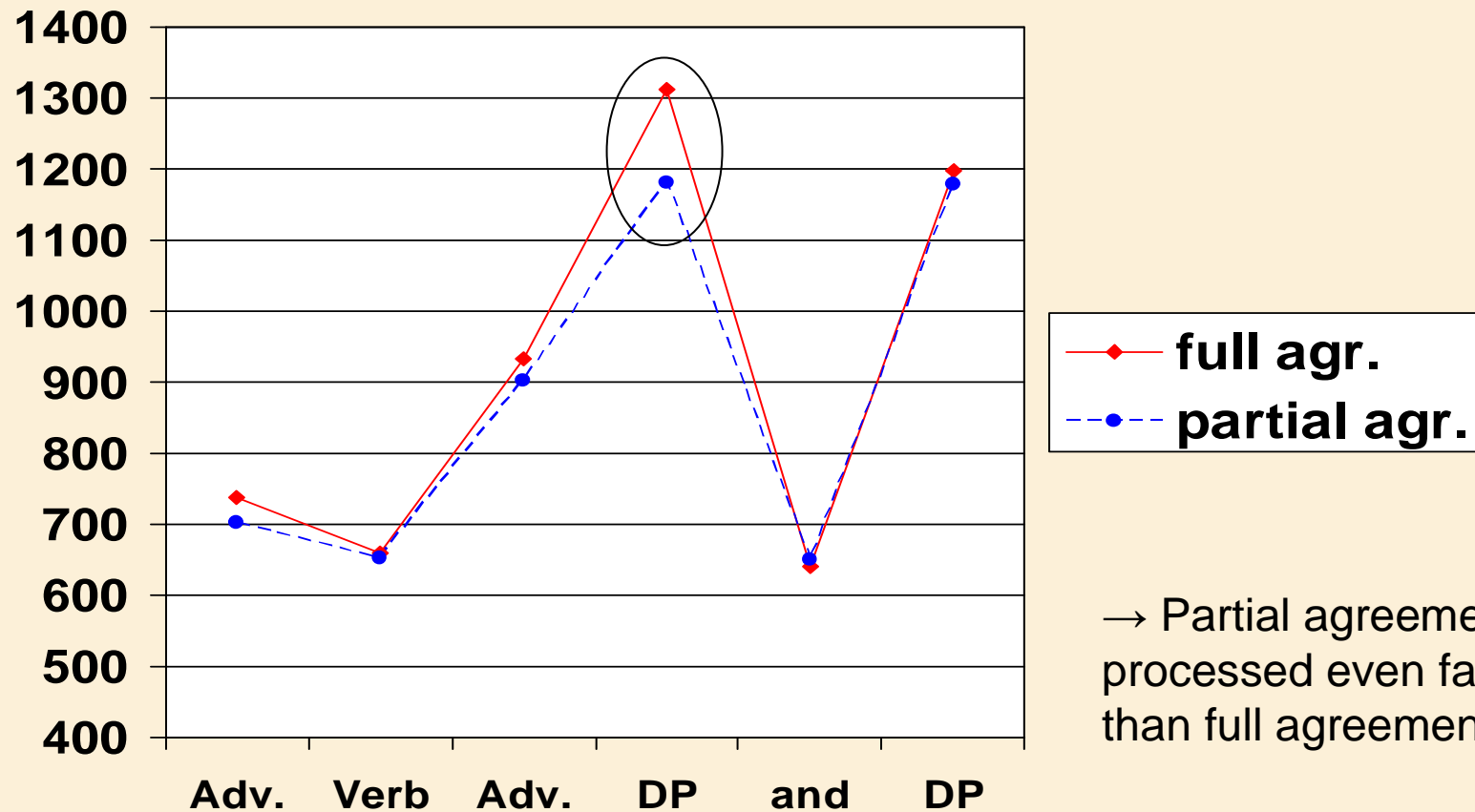
Mean reading times per segment (postverbal subjects)



→ Partial agreement is processed as easily as full agreement.



Mean reading times per segment (distant postverbal subjects)



Results: Self-paced reading experiment

- Partial agreement was processed significantly more easily with postverbal subjects than with preverbal ones (paired t-test: $t_1(47) = 2.695$, $p = .010$; $t_2(35) = 3.108$, $p = .004$)
→ confirms Hypothesis 2
- Preferences:
 - *Preverbal subjects*: Preference for full agreement.
 - *Postverbal subjects*: No clear preference.
 - *Distant postverbal subjects*: Preference for partial agreement
→ Hypothesis 3 can be confirmed
- The same sentences that are rated as ungrammatical are processed easily or are even preferred during reading.
→ confirms Hypothesis 1



Overall results

- Evidence for Hypothesis 2 from all data types:
Partial agreement occurs more frequently and is processed more easily with postverbal subjects.
- Evidence for Hypothesis 3 from reading times:
Partial agreement is processed more easily when the distance between verb and postverbal subject is increased.
- Evidence for Hypothesis 1 from all data types:
Partial agreement occurs more frequently and is processed more easily in online data sources than in offline data.



Conclusion

- Evidence that partial agreement is strongly influenced by processing mechanisms and processing load.
- It is important to take into account online and offline aspects of the data sources in contrasting data types.

